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Abstract:

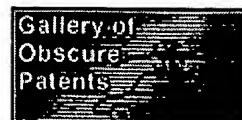
PROBLEM TO BE SOLVED: To sustain the spatial occupancy of a print head at a minimum level by forming a plurality of under glaze layers on an insulating substrate, forming a conductor at any part thereon and then forming heating resistors on the uppermost layer of each under glaze layer.

SOLUTION: A plurality of under glaze layers 2 are formed on an insulating substrate 1 by printing and firing a glass material and a conductor 3 of gold is patterned at any part on the under glaze layers 2 by photolithography. Furthermore, a heating dummy heating element 5a and a station name dummy heating element 5b are formed on the uppermost one of a plurality of under glaze layers 4. Subsequently, the heating elements 5a, 5b, respective under glaze layers 4 and the conductor 3 are covered with a protective layer 6. According to the structure, spatial occupancy of a print head can be sustained at a minimum level.

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CLAIMS

[Claim 1] The printer characterized by providing the following. An insulating substrate. Two or more undershirt glaze layers formed on the aforementioned insulating substrate. The conductor formed in one on two or more aforementioned undershirt glaze layers of parts. The print head which possesses a wrap protective layer for the exoergic resistor formed on the maximum surface among two or more aforementioned undershirt glaze layers, and the undershirt glaze layer, the aforementioned conductor and the aforementioned exoergic resistor of the aforementioned plurality.

[Claim 2] It is the printer according to claim 1 which is formed so that the aforementioned undershirt glaze layer, the aforementioned exoergic resistor, and the aforementioned protective layer may make heights in the edge of a couple at which a print head counters, and is characterized by the aforementioned heights having thickness which absorbs deformation of the aforementioned insulating substrate.

[Claim 3] The printer according to claim 2 characterized by the thickness of the aforementioned heights being larger than the deformation of the aforementioned insulating substrate.

[Claim 4] The printer according to claim 2 or 3 characterized by the thickness of the aforementioned heights being 20-60 micrometers.

DETAILED DESCRIPTION

[0001] [The technical field to which invention belongs] this invention relates to the printer which prints the date etc., and relates to the printer which was suitable for printing a date or time at least to a ticket or a coupon ticket in the automatic ticket gate, the automatic-reset machine, etc. especially.

[0002] [Description of the Prior Art] The ticket gate business and settlement-of-accounts business in a station are sharply automated for the purpose of laborsaving etc. In this kind of an automatic ticket gate and an automatic-reset machine, the date (days and months) and time are printed for prevention, such as an unauthorized use, to the ticket put on the market automatically, the coupon ticket, and the ticket and coupon ticket which pass an automatic wicket.

[0003] The plan of the print head which prints a necessary date and/or necessary time is shown in a coupon ticket etc. at drawing 5 . Drawing 6 shows the cross section of the conventional print head which met the B-B' line of drawing 5 .

[0004] The undershirt glaze layers 2, such as glass, are formed on the insulating substrate 1 which consists of ceramics, such as an alumina (aluminum 2O3), the conductors 3, such

as gold (Au), and the exoergic resistor 5 for date stamp characters, date dummy exoergic resistor 5a and name-of-the-station dummy exoergic resistor 5b are further formed on it, and the whole surface is being worn by the protective layer 6.

[0005] As shown in drawing 9 , such a print head is arranged considering a couple as a unit so that it may counter in the printer main parts 7, such as an automatic ticket gate, and it is constituted so that the printing media 8, such as a coupon ticket, may pass through between this opposite side. When the printing medium 8 passes, after the pressure was added temporarily and an exoergic resistor is chosen, it generates heat and the necessary date and necessary time are printed by the predetermined field through a thermal paper in the printing side of the printing medium 8 to pass. In order to print the necessary date and necessary time in the always clear state at this time, it has been desired for the exoergic resistor forming face which is equivalent to the print head of a printer to be flat generally. Therefore, as shown in drawing 6 , the undershirt glaze layer 2 was formed in the whole surface so that the level difference of an exoergic resistor forming face and a substrate might not come out.

[0006] However, in the baking process of the alumina substrate 1 in the manufacture process of a print head, it deforms slightly, and it curves and arises. This curvature is larger than thickness b of the both ends of a print head. When printing is performed, it turns out that an exoergic resistor and the printing medium 8 curve to an opposite direction mutually when the printing medium 8 passes through between print heads, as shown in drawing 8 , it cannot contact good, but printing is not made or becomes blurred owing to this curvature. In addition, with having been shown in drawing 8 , when curvature arose in a substrate at an opposite direction, especially the problem was not generated.

[0007] Deformation of an alumina substrate is produced at the time of baking and printing. For example, this curvature is about 20 micrometers. This about only 20-micrometer curvature will reduce the quality of printing to printing media, such as a coupon ticket.

[0008] Then, since a conductor 3 would be directly printed [as shown in drawing 7] on the insulating substrate 1 although it becomes a desirable cross-section configuration if it is made not to form the undershirt glaze layer 2 in the center section of a substrate that bulky ***** of the exoergic resistors 5a and 5b should be carried out so that the curvature of the insulating substrate 1 can be absorbed, when it was inferior to the adhesion of a conductor pattern and an open circuit etc. arose, there was a possibility that reliability might be spoiled.

[0009] Solving the problem [printing / resulting from deformation (curvature) of such a substrate] of a blur with devising not the structure of a print head which was mentioned above itself but arrangement of a print head is also considered. If not parallel arrangement as shown in drawing 9 but the print head of a couple is shifted and arranged forward and backward about the conveyance direction of the printing medium 8, the fault of printing resulting from the curvature of a substrate is cancelable. However, a print

head, a reading sensor, etc. according to the medium to pass are built into the automatic ticket gate, and distribution of the space of the head and sensor which are held in inside for a thesis called the miniaturization of the automatic ticket gate itself becomes it with a problem, for example. About a coupon ticket, it compares with a ticket, or a commuter's ticket and a prepaid card also in the medium to pass, and operating frequency is a low. in order to fill the needs of the industry of if possible miniaturizing an automatic ticket gate, it does not consider as opposite arrangement which the rate which occupies the space of the print head for coupon tickets will surely be restricted, and mentioned above -- take -- there is nothing Therefore, in order to raise a quality of printed character, adopting arrangement other than opposite arrangement had restrictions.

[0010] [Problem(s) to be Solved by the Invention] In the conventional print head, there was a problem that printing was not made by printing media, such as a coupon ticket, good by the curvature of the substrate produced slightly as mentioned above.

[0011] then -- while this invention maintains the space pulse duty factor of a print head at minimum -- a simple means -- good -- and reliability -- it aims at offering the printer possessing a highly printable print head

[0012] [Means for Solving the Problem] The printer of this invention is characterized by having the print head which possesses a wrap protective layer for the conductor formed in one on an insulating substrate, two or more undershirt glaze layers formed on the insulating substrate, and two or more undershirt glaze layers of parts, the exoergic resistor formed on the maximum surface among two or more undershirt glaze layers, and two or more undershirt glaze layers, conductors and exoergic resistors.

[0013] In the edge of a couple at which a print head counters, it is formed so that heights may be made, and as for the undershirt glaze layer, the exoergic resistor, and the protective layer, heights have thickness which absorbs deformation of the aforementioned insulating substrate.

[0014] The thickness of these heights is larger than the deformation of an insulating substrate, and 20-60 micrometers of thickness of heights are 40-60 micrometers preferably.

[0015] According to this invention, even if the curvature to the side which does not contact deformation, especially a printing medium arises in an insulating substrate, it is printable by the outstanding fixed quality of printed character which is not produced [blur / printing]. It excels in the point which a blur does not produce in the four corners of a printing medium especially very much.

[0016] As an insulating substrate used for the print head of this invention, what consists of ceramics, such as an alumina (aluminum 2O3), for example is mentioned. Glass is mentioned as an undershirt glaze layer used for the print head of this invention. As a conductor used for the print head of this invention, although gold (Au) is generally mentioned, copper (Cu), nickel (nickel), etc. are sufficient.

[0017] There are an exoergic resistor which performs the usual sensible-heat printing, and a dummy exoergic resistor which does not perform sensible-heat printing as exoergic resistor in the print head of this invention. This dummy exoergic resistor is the thing of the sake which only earns thickness so that it may be called the so-called spacer, in order that a print head may press media, such as a ticket and a coupon ticket, uniformly as this invention person is indicating to JP,7-232448,A. The gestalt of a dummy exoergic resistor can choose suitably the shape of the shape of the shape of the shape of the shape of solid one, and a stripe, and a matrix, and a whorl, or an island etc. as indicated by this official report.

[0018] These exoergic resistor is formed with the paste for resistance.

[0019] Moreover, as a matter which the exoergic resistor which performs sensible-heat printing prints, in addition to this, it is printable if needed [, such as the amount of money and a name of the station,], although a date (date) and/or time are mentioned suitably, for example.

[0020] The material of the insulating substrate mentioned above, an undershirt glaze layer, a conductor, and an exoergic resistor, a configuration, a pattern, a size, etc. can be suitably chosen according to the use of a print head.

[0021] That the print head of a couple is provided and at least one side should just be the print head of above-mentioned composition among the print heads of the couple, the printer of this invention is a book, even if another side is other print heads.

[0022] [Embodiments of the Invention] The plan of the print head which prints a necessary date and/or necessary time is shown in a coupon ticket etc. at [example 1] drawing 1 . Drawing 2 shows the cross section of the print head by this invention which met the A-A' line of drawing 1 .

[0023] On the insulating substrate 1 which consists of ceramics, such as an alumina (aluminum 2O3), the undershirt glaze layer 2 which consists of glass which printed and calcinated glass material is formed by about [30-40micrometer**5micrometer] thickness by the silk-screen-printing method etc.

[0024] On the undershirt glaze layer 2, patterning of the conductor 3 which consists of gold by the photolithography method is carried out to about [6-18micrometer**2micrometer] thickness, and it is formed.

[0025] Moreover, similarly the undershirt glaze layer 4 which consists of glass which printed and calcinated glass material too is formed in the near ends through which the printing medium contacts and passes at the time of conveyance of a printing medium by about [30-40micrometer**5micrometer] thickness by the silk-screen-printing method etc.

[0026] Furthermore, on the undershirt glaze layer 4, similarly patterning of the exoergic resistor 5 (not shown to drawing 2) for date stamp characters, exoergic date dummy exoergic resistor 5a, and the name-of-the-station dummy exoergic resistor 5b is carried out by the photo lithography method, for example, it forms at about [30micrometer**5micrometer] thickness.

[0027] And similarly the whole surface is worn by the silk-screen-printing method etc. by the about [thickness 10-40micrometer**5-2micrometer] protective layer 6 which consists of glass which printed and calcinated glass material. Furthermore, this protective layer 6 is mechanically ground with the surface grinder for example, using the paper for polish.

[0028] thus, the produced print head -- a couple -- as opposite arrangement is carried out, it includes in the main part of an automatic ticket gate

[0029] Between the undershirt glaze layers 2 and the undershirt glaze layers 4 which were formed in the near ends through which the printing medium contacts and passes at the time of conveyance of a [example 2] printing medium A printer as shown in drawing 3 like an example 1 is produced except having formed undershirt glaze layer 4' which consists of glass which printed and calcinated glass material by about [30-40micrometer**5micrometer] thickness by the silk-screen-printing method etc. still the more nearly same.

[0030] thus, the produced printer -- a couple -- as opposite arrangement is carried out, it includes in the main part of an automatic ticket gate

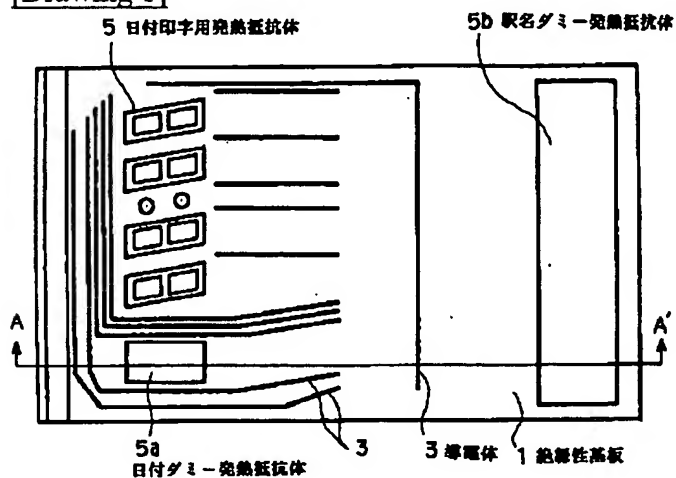
[0031] In addition, this invention is not limited to the embodiment of the above-mentioned instantiation, and can take various deformation within the limits of the meaning of invention. You may change composition as specifically change the material used for a print head, for example, the object for name-of-the-station printing for exoergic resistor metallurgy frame printing or a dummy exoergic resistor is used or the part of an exoergic resistor and a dummy exoergic resistor, a size, and a configuration are changed.

[0032] A situation in case the printing medium 8 passes the print head by the operation form of the above-mentioned instantiation is shown in drawing 4 . In drawing 4 , since the thickness b of the both ends of a print head is larger than curvature a of a substrate, curvature a is absorbable. ** which consists of two or more undershirt glaze layers, dummy exoergic resistors, and protective layers as shown in drawing 4 -- it passes without a printing medium curving by high heights, and good printing of a date, a name of the station, etc. is made by the printing medium

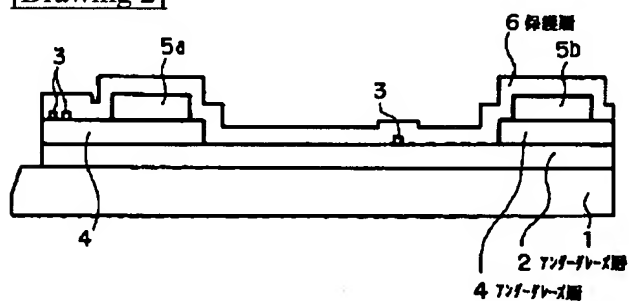
[0033] [Effect of the Invention] According to the printer of this invention, quality printing which is not produced [ununiformity / printing concentration / a printing defect, poor printing,] even if curvature arises keeping electric high reliability and a low space pulse duty factor can be performed.

DRAWINGS

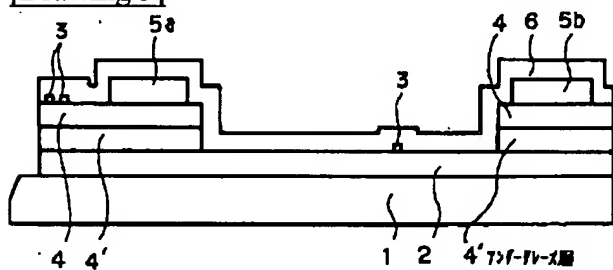
[Drawing 1]



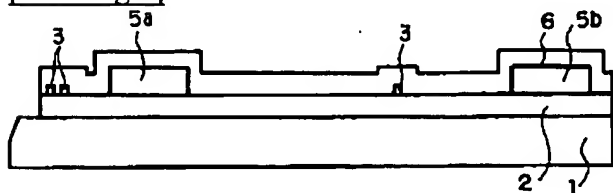
[Drawing 2]



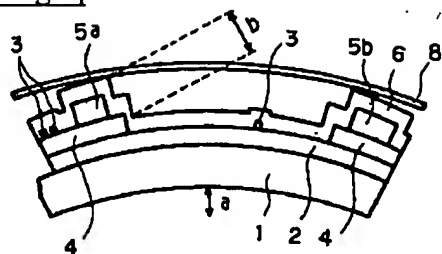
[Drawing 3]



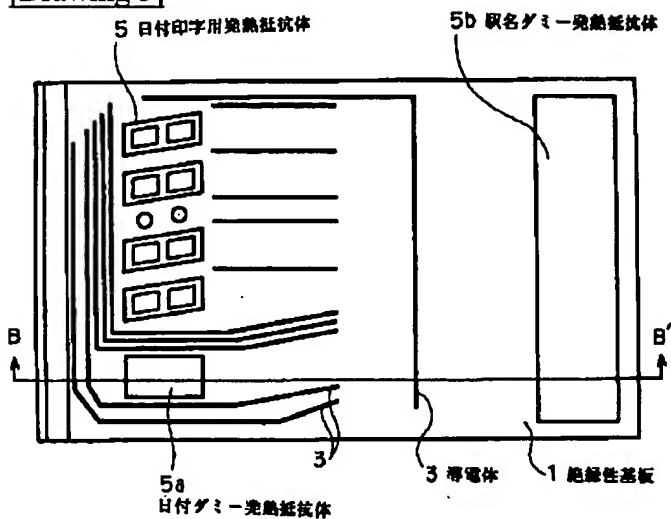
[Drawing 6]



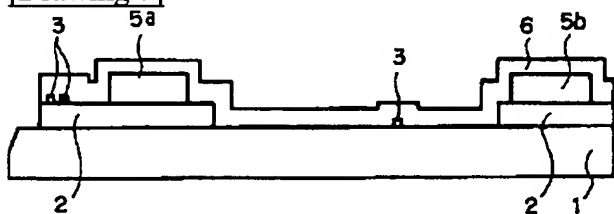
[Drawing 4]



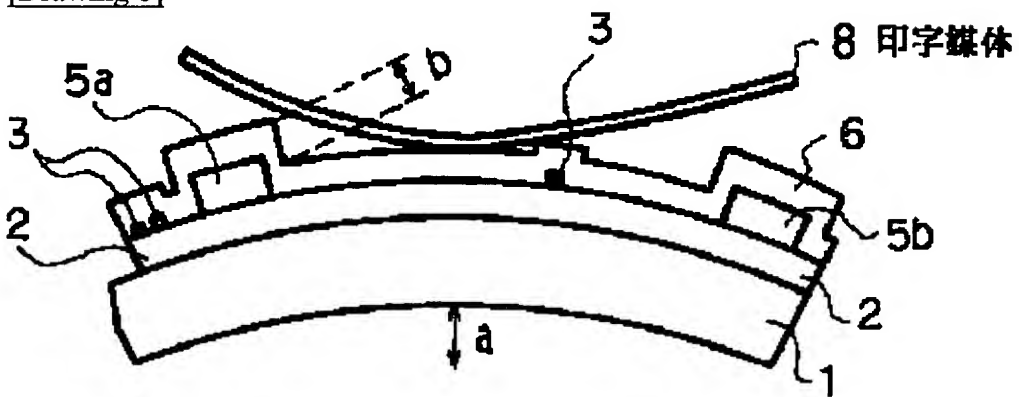
[Drawing 5]



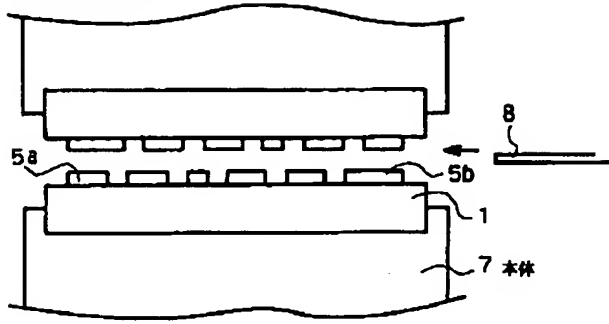
[Drawing 7]

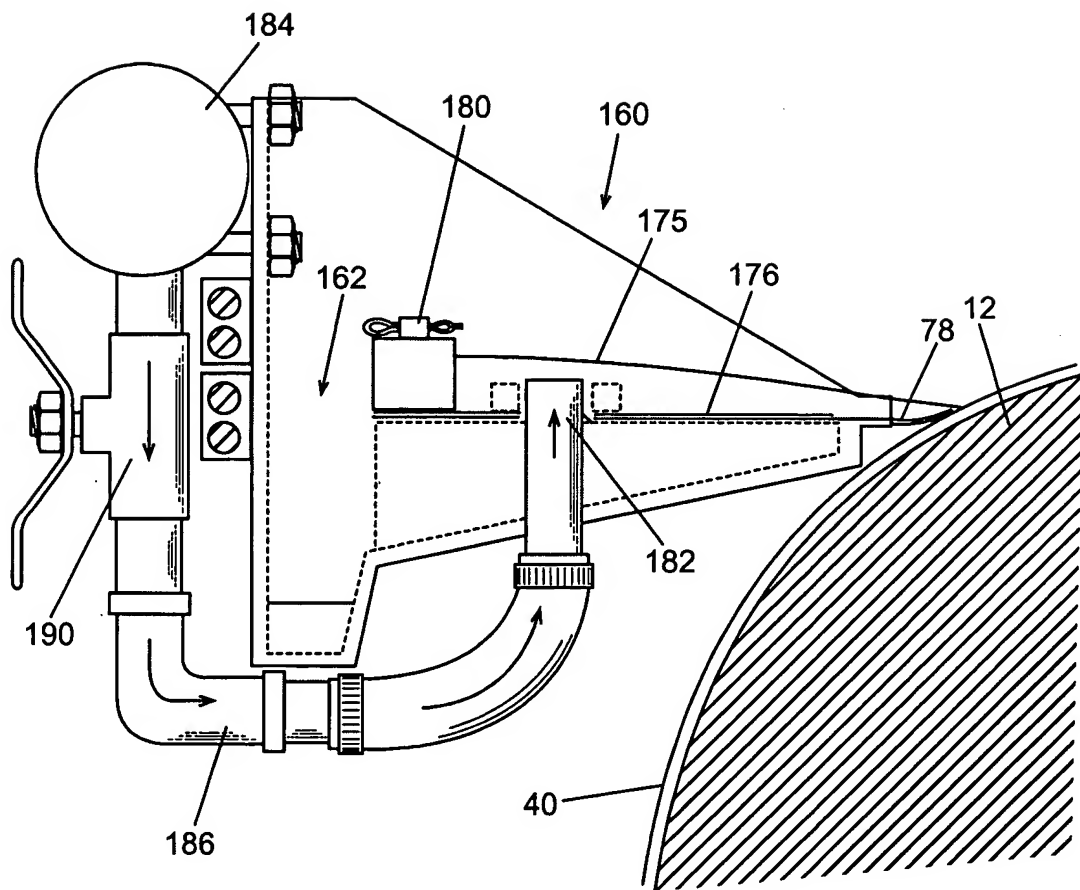


[Drawing 8]



[Drawing 9]



***Fig. 5***